

**Wolf
Management Report
of survey-inventory activities
Federal Aid in Wildlife Restoration
1 July 1996–30 June 1999**

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Alaska Department of Fish and Game
Division of Wildlife Conservation
December 2000**

Please note that population and harvest data in this report are estimates and may be refined at a later date.

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STATE OF ALASKA

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DEPARTMENT OF FISH AND GAME

Frank Rue, Commissioner

DIVISION OF WILDLIFE CONSERVATION

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LOCATION

GAME MANAGEMENT UNIT: 20D (5637 mi²)

GEOGRAPHIC DESCRIPTION: Central Tanana Valley near Delta Junction

BACKGROUND

Wolves are present throughout Unit 20D where their primary prey are moose, caribou, and Dall sheep. Wolf and prey numbers were high in Unit 20D during the 1960s. The wolf population was an estimated 200–250 at that time (38.3–48.2 wolves/1000 mi² or 14.8–18.6 wolves/1000 km²). Moose populations began to decline in the mid-1960s, and a wolf reduction program was authorized in 1979 to increase moose numbers (ADF&G 1984). This program included issuing aerial shooting permits to the public. From fall 1979 to spring 1983, 105 wolves were removed by trappers, ADF&G staff, and hunters with permits for aerial shooting. Most wolves were taken in southern and eastern Unit 20D (ADF&G 1983). Since the wolf reduction program ended in spring 1983, all wolf harvest has been by hunting or trapping.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

Wolf populations will be managed to provide for human uses and to ensure that wolves remain an integral part of Interior Alaska's ecosystems. Compatible human uses include hunting and trapping (both for personal use and commercial sale of furs), photography, viewing, listening, and scientific and educational purposes. The aesthetic value of being aware of or observing wolves in natural interactions with their environment is also recognized as an important human use of wolves. The domestication of wolves for personal use or for commercial purposes is generally considered incompatible with department management policies.

Management may include manipulation of wolf population size and total protection of wolves from human influence. Not all human uses will be allowed in all areas or at all times. Management will focus on providing sustained, diverse human uses of wolf populations consistent with goals listed in the Wolf Conservation and Management Policy for Alaska, adopted by the Alaska Board of Game 30 October 1991 and revised 29 June 1993. Those goals are:

- Ensure the long-term conservation of wolves throughout their historic range in Alaska in relation to their prey and habitat.
- Provide for the broadest possible range of human uses and values of wolves and their prey populations that meet wildlife conservation principles and which reflect the public's interest.

- Increase public awareness and understanding of the uses, conservation and management of wolves, their prey and habitat in Alaska.

MANAGEMENT OBJECTIVES

- Conduct wolf predation control reduction programs as directed by the commissioner and the Board of Game.
- Manage harvest to maintain a population of between 15 and 125 wolves, the population objective set by the Board of Game.
- Provide trapper education programs to improve trapper skills, ethics, and regulatory compliance.
- Model the potential effects of wolf predation on ungulates within Unit 20D.

METHODS

We estimated wolf population size using aerial surveys; observations of packs with radiocollared wolves; interviews with local trappers, hunters, and pilots; and information about pack size recorded on fur sealing certificates. Aerial surveys were conducted by flying major rivers, creeks, exposed ridges, and other locations and searching for wolf tracks. When tracks were located, the number of wolves and their direction of travel were determined. Survey information was recorded on topographic maps. Information from interviews with reliable local pilots, hunters, and trappers was also used to determine pack size. Wolves harvested during the winter were added to spring pack size if known, to estimate fall pack size prior to hunting and trapping season. In some cases, fall pack size was known for packs observed during that time period. The total number of wolves estimated in the subunit was increased by an additional 10% that were assumed to be lone wolves not associated with a pack.

One wolf pack, the 100-Mile Creek pack resides primarily in eastern Unit 20A but was included in the Unit 20D population estimate. The 100-Mile Creek pack ranges well into Unit 20D and is trapped by several trappers in Unit 20D. Therefore, I calculated a "pack equivalent" for the 100-Mile Creek pack by multiplying estimated pack size by 20% (the estimated amount of time the pack spends in Unit 20D) to calculate a pack equivalent that was added to the Unit 20D population estimate. Population data were summarized by regulatory year (RY = 1 Jul through 30 Jun, e.g., RY99 = 1 Jul 1999 through 30 Jun 2000).

Wolves harvested by trappers and hunters were sealed to monitor harvest. Information recorded for each wolf included date of kill, name of trapper or hunter, location of kill, method of take and transportation, sex of the wolf, color of the pelt, and the number of other wolves thought to be in the pack. Harvest data were summarized by regulatory year.

Unit 20D was subdivided into 2 areas using the Tanana River as the boundary. The portion of Unit 20D south of the Tanana River is southern Unit 20D. The portion of Unit 20D north of the Tanana River is northern Unit 20D.

Wolves from some northern Unit 20D packs were radiocollared as part a research project being conducted in the Fortymile Nonlethal Predation Control Area. Dominant wolves within some of these packs were also sterilized and other members of the packs were relocated to areas outside of Unit 20D. Boertje and Gardner (2000) reported methods and results for this project.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The fall 1996 wolf population met the management objective and was estimated at 96–107 in 14 packs, including “loners” (Table 1). This is slightly lower than the fall 1995 estimate of 116–128 wolves. The number of wolves in southern Unit 20D was 32–40 in 6 packs. This estimate includes a “pack equivalent” of 2 wolves from the 100-Mile Creek pack. Northern Unit 20D had an estimated 54–57 wolves. An additional 9–10 were added to the unit estimate for an assumed 10% “loners.” This population estimate resulted in an estimated density of 18.3–20.5 wolves/1000 mi² (7.1–7.9 wolves/1000 km²) in the unit.

The fall 1997 wolf population met the management objective and was estimated at 117–122 in 13 packs, including “loners” (Table 1). The number of wolves in southern Unit 20D was estimated at 31–34 in 5 packs. This estimate includes a “pack equivalent” of 3 wolves from the 100-Mile Creek pack. Northern Unit 20D had an estimated 75–77 in 8 packs. An additional 11 wolves were added to the estimate for an assumed 10% “loners” in the unit. This population estimate resulted in an estimated density of 22.5–23.6 wolves/1000mi² (8.7–9.1 wolves/1000 km²) in the unit.

The fall 1998 population estimate was incomplete because no estimate was calculated for southern Unit 20D due to poor spring survey conditions. Therefore, the only estimate was for northern Unit 20D, which was 56–58 wolves in 8 packs (Table 1). Because a unitwide population was not estimated, it was not possible to determine if the population objective was achieved. The significant reduction in the northern Unit 20D population estimate from fall 1997 was due in large part to 2 large packs being trapped by trappers and being treated in the Fortymile Nonlethal Predation Control Program. The Indian-Tibbs pack had 10 wolves in fall 1997 but had 5 wolves trapped, 3 relocated, and the remaining 2 sterilized during winter 1997–1998. The Black Mountain–Harper pack had 6 wolves trapped, 3 relocated, and the remaining 2 sterilized. In fall 1998 these 2 packs had 2 and 3 wolves, respectively.

Distribution and Movements

Wolves from several packs in northern Unit 20D were radiocollared as part of the Fortymile Caribou Herd Nonlethal Predation Control Program. Boertje and Gardner (2000) reported movements of these wolves.

MORTALITY

Harvest

Season and Bag Limit.

Unit/Bag Limit/ Special Restrictions	Resident Open Seasons	Nonresident Open Seasons
Unit 20D		
<i>RY96</i> HUNTING: 5 wolves. No wolf hunting same day airborne. TRAPPING: No limit. No same-day-airborne shooting of wolves, except wolves caught in a trap or snare, or further than 300 ft from the airplane at the time of taking. No trapping with a steel trap or with a snare smaller than 3/32" in diameter during April or October.	10 Aug–30 Apr 15 Oct–30 Apr	10 Aug–30 Apr 15 Oct–30 Apr
<i>RY97</i> HUNTING: 5 wolves. No wolf hunting same day airborne. TRAPPING: No limit. A wolf may be shot same day airborne if caught in a trap or snare. No trapping with a steel trap or with a snare smaller than 3/32" in diameter during April or October.	10 Aug–30 Apr 15 Oct–30 Apr	10 Aug–30 Apr 15 Oct–30 Apr
<i>RY98</i> HUNTING: 5 wolves. No wolf hunting same-day-airborne. TRAPPING: No limit. A wolf may be shot same day airborne if caught in a trap or snare. No trapping with a steel trap or with a snare smaller than 3/32" in diameter during April or October.	10 Aug–30 Apr 15 Oct–30 Apr	10 Aug–30 Apr 15 Oct–30 Apr

Board of Game Actions and Emergency Orders. The Alaska Board of Game took no actions and no emergency orders were issued during this reporting period.

During November 1996, a statewide ballot initiative resulted in repeal of a 1993 Board of Game regulation that authorized trappers to take wolves same-day-airborne if wolves were at least 300 ft from airplanes. The same-day-airborne repeal became effective 25 February 1997.

Hunter/Trapper Harvest. Hunters and trappers reported taking 28 wolves in RY96, 41 in RY97, and 25 in RY98 (Table 2). The mean annual harvest of 31 wolves during RY96–RY98 was lower than during the previous 3 years. During RY96–RY98, 56% of harvested wolves were male, 36% were female, and 7% were unknown sex.

Trappers and hunters took more wolves from southern than from northern Unit 20D during RY96–RY98. This likely occurred because road access is better in southern than in the northern part of the unit. In RY96, 64% of wolves were taken in southern Unit 20D, compared to 36% from northern Unit 20D (Table 3). In addition, 4 wolves from the Black Mountain-Harper Pack in northern Unit 20D were relocated to an area outside the subunit (Boertje and Gardner 2000). In RY97, 59% of wolves were harvested from southern Unit 20D, and 41% were taken from northern Unit 20D. Also, 6 wolves were relocated outside of the unit from northern Unit 20D packs. Three of these wolves were relocated from the Indian/Tibbs pack, and 3 came from the Black Mountain-Harper Pack. During RY98, 52% of harvested wolves were taken from southern Unit 20D, and 48% came from northern Unit 20D. One wolf was relocated from the Black Mountain-Harper pack in northern Unit 20D.

Most wolves were taken each year by trapping and snaring. Seventy-nine percent, 98% and 96% were taken in traps or snares during RY96, RY97, and RY98, respectively (Table 2). In RY96, trappers were allowed to shoot wolves same-day-airborne if the wolf was over 300 feet from the aircraft. However, only 1 of the 6 wolves reported taken by shooting that year was taken with the aid of an airplane.

The RY96 harvest rate for trappers and hunters was 26–29% of the estimated fall wolf population. When the 4 wolves relocated from northern Unit 20D are added to the harvest, an estimated 30–33% of the wolves were removed from the unit. During RY97, trappers and hunters took 34–35% of the estimated fall population. Adding 6 wolves relocated from the unit to the harvest results in an estimated 39–40% of the wolves being removed. No harvest rate was calculated for RY98 because the population estimate was incomplete during that year.

The National Research Council (1997) reported that determining sustainable levels of wolf harvest is difficult, but estimates of sustainable rates of harvest vary from less than 30% up to 40% of early winter populations. Harvest and relocation of Unit 20D wolves did not exceed 40% of the estimated population during this reporting period. However, 2 packs in northern Unit 20D have been reduced in size and the dominant pair sterilized, which may delay the recovery time for these packs.

Harvest Chronology. There were no significant changes in wolf harvest chronology during RY96–RY98. Most wolves were harvested during November through March (Table 4).

Transport Methods. Snowmachines and highway vehicles were the most common mode of transportation used by trappers and hunters who harvested wolves (Table 5). Snowmachines were used to take 49% of the wolves during RY96–RY98, and highway vehicles were used to take 27%.

CONCLUSIONS AND RECOMMENDATIONS

Wolf management objectives established by the Alaska Board of Game were met during this reporting period. Recent harvest rates combined with experimental relocation of wolves from Unit 20D have been near or possibly exceeded maximum sustainable levels. Because the Alaska Board of Game has determined that human use of moose and Macomb caribou in Unit 20D is the preferred use, and have adopted a wolf control implementation plan for wolves in Unit 20D, the current rate of harvest is acceptable until the wolf population is reduced to the lower limit of the population objective. No regulatory changes are recommended at this time.

The only quantifiable objective during this reporting period was to manage harvest to maintain a population of between 15 and 125 wolves. Other objectives were not quantifiable and, therefore, could not be readily evaluated. During the next report period they will be defined as activities and management direction will be to:

MANAGEMENT GOALS

- Ensure the long-term conservation of wolves throughout their historic range in Alaska in relation to their prey and habitat.
- Provide for the broadest possible range of human uses and values of wolves and their prey populations that meet wildlife conservation principles and which reflect the public's interest.
- Increase public awareness and understanding of the uses, conservation and management of wolves, their prey and habitat in Alaska.

MANAGEMENT OBJECTIVE

- Manage harvest to maintain a population of between 15 and 125 wolves.

MANAGEMENT ACTIVITIES

- Conduct wolf predation control reduction programs as directed by the commissioner and the Board of Game.
- Provide trapper education programs to improve trapper skills, ethics, and regulatory compliance.

- Model the potential effects of wolf predation on ungulates within Unit 20D.

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Table 1 Unit 20D fall wolf population estimate, regulatory years 1996–1997 through 1998–1999

Area	Regulatory year		
	1996–1997	1997–1998	1998–1999
Southern Unit 20D ^{a,b}	32–40	31–34	— ^c
Northern Unit 20D ^d	54–57	75–77	56–58
Unit 20D Subtotal	86–97	106–111	— ^c
Estimate 10% "loners"	9–10	11	— ^c
Unit 20D Total	96–107	117–122	— ^c
Estimated wolves/1000 km ²	7.1–7.9	8.7–9.1	

^a Includes a "pack equivalent" calculation for the 100-Mile Creek pack which overlaps eastern Unit 20A.

^b Unit 20D south of the Tanana River.

^c No estimate due to poor spring survey conditions.

^d Unit 20D north of the Tanana River.

Table 2 Unit 20D wolf harvest, regulatory years 1985–1986 through 1998–1999

Regulatory year	Reported harvest			Estimated harvest		Method of take				Total
	M	F	Unk	Unreported	Illegal	Trap/snare	Shot	SDA ^a	Unk	
1985–1986	17	10	1	0	0	19	0	9	0	28
1986–1987	11	7	0	0	0	18	0	0	0	18
1987–1988	5	7	0	0	0	11	1	0	0	12
1988–1989	5	12	4	0	0	20	1	0	0	21
1989–1990	2	4	0	0	0	4	2	0	0	6
1990–1991	8	13	2	0	0	6	4	13	2	23
1991–1992	4	3	2	0	0	3	5	1	0	9
1992–1993	8	9	5	0	0	16	6	0	0	22
1993–1994	17	27	4	0	0	37	10	0	1	48
1994–1995	16	9	0	0	0	24	1	0	0	25
1995–1996	16	24	1	0	0	39	1	0	1	41
1996–1997	17	10	1	0	0	22	6	0	0	28 ^b
1997–1998	22	15	4	0	0	37	3	0	1	41 ^c
1998–1999	14	9	2	0	0	24	1	0	0	25 ^d

^a SDA refers to animals taken by hunters the same day hunters were airborne.

^b An additional 4 wolves were relocated from northern Unit 20D to another area.

^c An additional 6 wolves were relocated from northern Unit 20D to another area.

^d An additional 1 wolf was relocated from northern Unit 20D to another area.

Table 3 Unit 20D Wolf harvest by location, regulatory years 1996–1997 through 1998–1999

Regulatory year	North of Tanana River	South of Tanana River
1996–1997	10	18
1997–1998	17	24
1998–1999	12	13

Table 4 Unit 20D wolf harvest chronology, regulatory years 1985–1986 through 1998–1999

Regulatory year	Harvest periods											n
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk	
1985–1986		0	0	0	4	3	4	5	8	2	2	28
1986–1987		0	0	0	0	2	8	2	6	0	0	18
1987–1988		1	0	0	4	0	1	6	0	0	0	12
1988–1989		0	0	0	0	5	5	10	0	1	0	21
1989–1990		0	1	0	0	3	0	0	2	0	0	6
1990–1991		0	0	2	2	0	0	3	16	0	0	23
1991–1992		0	2	0	0	2	1	1	3	0	0	9
1992–1993		1	1	0	2	8	0	4	3	2	1	22
1993–1994		0	5	0	6	11	6	4	16	0	0	48
1994–1995		0	1	0	0	3	6	8	6	1	0	25
1995–1996		0	0	0	9	7	8	7	9	1	0	41
1996–1997	0	2	2	1	6	4	4	7	1	0	0	27
1997–1998	1	0	1	0	9	9	8	3	9	1	0	41
1998–1999	0	0	0	0	6	8	4	5	2	0	0	25

Table 5 Unit 20D wolf harvest by transport method, regulatory years 1985–1986 through 1998–1999

Regulatory year	Harvest by transportation method								Unk	n
	Airplane	Dogsled, skis, snowshoes	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk		
1985–1986	10	0	0	0	16	0	1		1	28
1986–1987	1	1	0	0	16	0	0		0	18
1987–1988	1	5	0	0	4	0	1		1	12
1988–1989	0	0	0	0	21	0	0		0	21
1989–1990	0	0	0	0	4	1	0		1	6
1990–1991	15	0	0	0	4	1	3		0	23
1991–1992	1	0	0	0	6	0	2		0	9
1992–1993	10	0	0	1	8	1	0		2	22
1993–1994	7	0	0	0	34	0	5		2	48
1994–1995	0	1	0	0	17	0	6		1	25
1995–1996	1	2	0	2	22	1	13		0	41
1996–1997	1	2	0	1	13	1	9		0	28
1997–1998	0	4	0	0	22	0	6	9	0	41
1998–1999	0	3	0	1	11	0	10	0	0	25

LOCATION

GAME MANAGEMENT UNIT: 20E (10,680 mi²)

GEOGRAPHIC DESCRIPTION: Fortymile, Ladue, and Charley River drainages

BACKGROUND

Since the 1940s wolf numbers in Unit 20E have fluctuated due to federal and state wolf control programs, harvest pressure, and ungulate densities. Murie (1944) reported that wolves were abundant in the region during the 1940s but were rapidly reduced by a federal predator reduction program during 1948–1960 (Gasaway et al. 1992). Wolves were killed by poison, cyanide guns, disrupting dens, year-round trapping, and aerial shooting. Once the control program ceased in 1960, wolves again became abundant in Unit 20E. The wolf population subsequently declined during the mid-1970s after the area's moose and caribou populations declined to low levels (Gasaway et al. 1992).

Between 1975 and 1981 the wolf population was stable and lightly harvested (\bar{x} = 11% annual harvest rate). During 1981–1983 a wolf control program was conducted by the Alaska Department of Fish and Game (ADF&G) in a 6000-mi² area primarily located in Unit 20E. The combination of wolf control and public trapping reduced the wolf population by 73% by spring 1983. Subsequent harvest by public hunters and trappers maintained the population below precontrol size through 1986. Increased wolf productivity occurred following control efforts, indicating wolves were nutritionally limited by the initial low moose and caribou densities (Gasaway et al. 1992). During the late 1980s the wolf population in Unit 20E increased by approximately 17% annually, reaching an estimated 231 wolves in 1990. Between 1990 and 1995 wolf numbers fluctuated but overall remained stable.

Historically the wolf population in Unit 20E has been lightly harvested. However, during some years, moderate to high harvests caused population declines in accessible areas. Wolf trapping intensity is primarily affected by the fur market but it also is effected by trapping methods and means. When marten and lynx fur prices are high, most area trappers spend little time trapping wolves. Also, trapping pressure in Unit 20E was higher when land-and-shoot taking of wolves was legal because more nonlocal trappers traveled to the area. During 1995 and 1996, wolf harvest was higher due to a privately funded wolf harvest incentive program designed to increase wolf kill within the summer and winter ranges of the Fortymile caribou herd.

The effects of the 1981–1983 wolf control program were difficult to interpret because the program was terminated prematurely and adequate removal rates were not obtained. Moose and caribou numbers did increase, but these increases may have been related to factors other than wolf control. Adult moose and caribou survival increased, but calf survival did not. However the wolf control area did not overlap any of the caribou herd's calving range. Gasaway et al. (1992) concluded that in Unit 20E wolf predation on moose calves was not a detectable source of additive mortality when grizzly bears were abundant.

Since the early 1980s wildlife agencies in Alaska and Canada experienced difficulties in implementing wolf management programs because wolves are valued differently by different groups of people. Consequently, most wolf management programs did not receive uniform public support. To the trapper, wolves are a prized and important furbearer, and many trappers do not want to see management programs that cause large population declines. To some hunters, wolves are viewed as competitors. Those hunters feel wolves should be controlled to allow for more human use of ungulate resources. In contrast, others view wolves as a symbol of wilderness and believe wolves and their prey should be naturally regulated with little human influence.

Those philosophical differences concerning wolf management have caused heated disagreements and divisiveness between wildlife proponents. Most of the local residents in Unit 20E and adjacent Unit 12 support an intensive management program designed to increase caribou and moose numbers. Following the premature stoppage of the 1981 wolf control program and Governor Hickel's decision in 1992 to rescind a wolf control program scheduled to begin in 1993, it was evident any program designed to help ungulate populations recover in Unit 20E must include a diversity of public views concerning wildlife management and must include all of the responsible agencies.

In February 1994 the Fortymile Management Team was created. It included 14 public members representing a wide range of special interest groups and 5 management agencies. The team agreed to the goal of trying to manage for the recovery of the Fortymile caribou herd using a series of management steps designed to conserve habitat, reduce caribou harvest, and reduce wolf predation. The team developed a plan which recommended a combination of public trapping and state conducted nonlethal wolf control to reduce wolf predation on Fortymile caribou. The Alaska Board of Game adopted the implementation plan during spring 1996, and Governor Knowles allowed the nonlethal wolf control program to begin in fall 1997.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

Wolf populations throughout Interior Alaska will be managed to provide for human uses and to ensure that wolves remain an integral part of Interior Alaska's ecosystems. Compatible human uses include hunting and trapping (both for personal use and commercial sale of furs), photography, viewing, listening, scientific studies and education. The aesthetic value of being aware of or observing wolves in natural interactions with their environment is also recognized as an important human use of wolves. The domestication of wolves for personal use or for commercial purposes is generally considered incompatible with department management policies.

Management options range between manipulation of wolf population size and total protection of wolves from human influence. Not all human uses will be allowed in all areas or at all times; management will focus on providing sustained, diverse human uses of wolf populations consistent with goals listed in the Wolf Conservation and Management Policy for Alaska,

adopted by the Board of Game on 30 October 1991 and revised 29 June 1993. Those goals are to:

- Ensure the long-term conservation of wolves throughout their historic range in Alaska in relation to their prey and habitat.
- Provide for the broadest possible range of human uses and values of wolves and their prey populations that meet wildlife conservation principles and which reflect the public's interest.
- Increase public awareness and understanding of the uses, conservation and management of wolves, their prey, and habitat in Alaska.

MANAGEMENT OBJECTIVES

The following objectives were developed by the Fortymile Caribou Management Team to be followed during the 5-year nonlethal wolf control. New objectives will be developed following termination of the plan in 2001.

- Monitor wolf numbers, population characteristics, and harvests.
 - Monitor harvest through sealing records and trapper questionnaires.
 - Conduct fixed-wing aerial surveys during the winter in selected areas.
 - Radiocollar and monitor selected packs.
- Provide for the maximum harvest of wolves in western Unit 20E.
 - Through seasons and bag limits, allow for the greatest harvest to occur within and near the Fortymile caribou herd.
- Reduce the number of wolves on the Fortymile caribou herd's calving and summer range by relocating all members of up to 15 packs other than the dominate pair and controlling fertility among dominant pairs.
 - Monitor relocated wolves to determine survival, homing instinct, and establishment of territory.
 - Monitor sterilized wolves to determine pack size, territory size and usage, and kill rates.
 - Close trapping if the wolf population in the control area is reduced to 30 wolves.

METHODS

ESTIMATING WOLF POPULATION SIZE

Between fall 1991 and fall 1999 aerial wolf surveys (Stephenson 1978; Gasaway et al. 1983), standard radiotelemetry techniques, wolf observations by area pilots and trappers, and sealing documents were used to estimate wolf population size and trend. All estimates of wolf numbers were increased by 10% to account for lone wolves present but not found (Mech 1973). All wolf packs having territories wholly or partially in Unit 20E were included in the estimates. Population data were summarized by regulatory year (RY = 1 Jul through 30 Jun, e.g., RY99 = 1 Jul 1999 through 30 Jun 2000).

WOLF POPULATION CHARACTERISTICS

Within the Fortymile caribou herd's range, we captured 253 wolves between 1991 and 1999. Before November 1997 all wolves captured were radiocollared to help us evaluate wolf movements and numbers. Usually 2–3 wolves were radiocollared per pack. Since November 1997 we have relocated 82 wolves from 15 packs and radiocollared 30 of these wolves. We have sterilized 34 adult wolves (19 females and 15 males) and radiocollared all of them to evaluate the efficacy of fertility control, determine if the sterilized pair maintained their alpha status and territory, and monitor the pairs' movement patterns. Wolves captured outside of the nonlethal control treatment area were part of packs we were using as control packs to evaluate the effects of relocation and sterilization. Blood samples and body measurements were routinely taken from all captured wolves. Radiocollared wolves were located periodically during the year to determine pack and territory size, movement patterns, and population demographics.

NONLETHAL WOLF CONTROL

In November 1997 we began relocating all subordinate wolves and sterilizing the 2-parent wolves in 15 packs most accountable for Fortymile caribou calf mortality. Wolves to be relocated or sterilized were captured using methods outlined in Boertje and Gardner (2000). Relocated wolves were moved >100 miles from their original territory in 1997 and >200 miles during 1998–2000 to minimize the chance for their return. These wolves were released in areas that supported ungulate densities as high or higher than in their original territory. The dominant wolves were sterilized by veterinary surgeons. The males were vasectomized and the females were tubal ligated to retain gonadal cycling. The sterilized wolves were kept overnight for observation to ensure the wolves were completely recovered from the immobilizing drug before release. The sterilized wolves were released at or near the point of capture.

HARVEST MONITORING

We determined harvest statistics from sealing documents and fur acquisition reports. An official ADF&G seal must be attached to all wolves taken in Alaska. During the sealing process, information is collected on specific location and method of take, date, sex, color of pelt, estimated size of the wolf pack, and transportation. Harvest data were summarized by regulatory year.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

We conducted thorough fall wolf surveys in most of Unit 20E during RY91, RY92, RY95, and RY96–RY98. Based on those surveys, the population seemed to have declined during RY90 but increased slowly until RY95 to 227–238 wolves (Table 1). The population remained relatively stable between fall RY95 and fall RY97 but probably declined slightly by fall RY98 due to a combination of nonlethal wolf control and public trapping.

Causes of the reduced count during RY91 are not known. Total reported harvest during RY90 was not high enough to explain the reduction. Survey conditions during RY91 were good in most areas of the subunit and our detection rate should have been comparable to other years.

During RY95 wolf numbers west of the Taylor Highway in Unit 20E, north of the Tanana River in Unit 20D, and along the Salcha River in Unit 20B declined slightly following an intensive private wolf trapping effort to help recovery of the Fortymile caribou herd. Most of the harvest that occurred in Unit 20E was along the Taylor Highway and along the Middle and Mosquito Fork Rivers. Overall, harvest rate was about 57% and caused the subunit density to drop from about 7.1 to 6.8 wolves/1000 km². Harvest rates have been below sustainable levels since RY95.

During RY97 and RY98, pack size was reduced to 2 sterilized wolves in 6 packs in western Unit 20E, 3 packs in eastern Unit 20D along the Unit 20E border, 4 packs within Unit 20B, and 1 pack in Unit 25C. This was due to a combination of public trapping and ADF&G relocations. These efforts caused a slight decline in the subunit's wolf population and a 78% reduction within the 14 wolf pack territories. One additional wolf territory will be treated in winter RY99.

MORTALITY

Harvest

Season and Bag Limit.

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
<i>Regulatory year 1996</i>		
HUNTING: 5 wolves. No wolf hunting same day airborne.	10 Aug–30 Apr	10 Aug–30 Apr
TRAPPING: No limit. A wolf may be shot same day airborne if caught in a trap or snare, or trapper is over 300 ft from airplane. (This regulation was changed by a initiative disallowing wolves to be shot the	15 Oct–30 Apr	15 Oct–30 Apr

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
same day airborne unless the wolf was in a trap or snare.) No trapping with a steel trap or a snare smaller than 3/32 inch in diameter during April or October.		
<i>Regulatory year 1997</i>		
HUNTING: 5 wolves. No wolf hunting same day airborne.	10 Aug–30 Apr	10 Aug–30 Apr
TRAPPING: No limit. No trapping with a steel trap or a snare smaller than 3/32 inch in diameter during April or October.	15 Oct–30 Apr	15 Oct–30 Apr

Regulatory year 1998

HUNTING: 5 wolves. No wolf hunting same day airborne.	10 Aug–30 Apr	10 Aug–30 Apr
TRAPPING: No limit. No trapping with a steel trap or a snare smaller than 3/32 inch in diameter during April or October.	15 Oct–30 Apr	15 Oct–30 Apr

Board of Game Actions and Emergency Orders. In November 1996, Alaskan voters passed an initiative which prohibited same-day-airborne hunting of wolves, fox, lynx, and wolverine. This initiative became effective on 25 February 1997. An initiative to ban the use of snares to catch wolves failed in November 1998.

During their spring 1997 meeting, the board adopted the Fortymile Nonlethal Wolf Control Implementation Plan (Plan). Before nonlethal control activities began, Governor Knowles reviewed the Plan in relation to public acceptance, economic value, and scientific merit. He ruled in favor of the Plan and allowed the nonlethal wolf control plan to begin in November 1997.

During their spring 1998 meeting, the board designated the Unit 20E moose population within the Fortymile and Ladue River drainages and the Fortymile caribou herd as important for high levels of human consumptive use under the intensive management law (AS 16.05.255[e]-[g]). This designation means that the board must consider intensive management if regulatory action to significantly reduce moose or caribou harvest in Unit 20E becomes necessary because the population is depleted or has reduced productivity. Wolf control has been

identified by the legislature as an important management tool consistent with the intent of the intensive management law.

Hunter/Trapper Harvest. The reported annual Unit 20E wolf harvest was 54, 36, and 17 wolves during RY96, RY97, and RY98, respectively (Table 2). Average annual harvest during the previous report cycle (RY93–RY95) was 64 wolves, which was 1.8 times the current report period average and was 2.6 times the average harvest during RY88–RY92. During RY96–RY98 the estimated harvest rate was 8–24%, which is below the sustainable harvest of 25–30% of the estimated fall population.

Elevated harvest during RY95 and RY96 in portions of Unit 20E was due to the Fortymile Caribou Calf Protection Program, which was developed by trappers to assist the recovery of the Fortymile caribou herd. To stimulate harvest, this group paid \$400.00/wolf caught within the range of the Fortymile Herd. This payment approximately doubled the market value of wolf pelts and was instrumental in increasing the harvest. The trappers who administered this program were against implementation of the nonlethal wolf control program, believing that the trapping program was all that was necessary to benefit herd growth. When the nonlethal wolf control program was adopted by the Board of Game in spring 1997, the trapping group decided to end the privately supported trapping program, and in addition, one of the primary fur buyers in the Interior decided not to purchase any wolves trapped in Unit 20E. These decisions were the primary causes for reduced wolf capture during RY97 and RY98. It is unfortunate this split between trappers and the Fortymile caribou recovery program occurred. The program benefited from their participation.

Trappers continued to use snares and traps as the primary methods to catch wolves in Unit 20E (Table 2). During RY96–RY98, 3–6 wolves were taken by hunters primarily incidentally to moose or caribou hunts during the fall hunting season.

Harvest Chronology. During RY96 and RY97, the average percent wolf harvest during August and September (wolf hunting only), November through March (snaring, trapping, and hunting), and October and April (snaring only) was 7%, 87%, and 6%, respectively (Table 3). Most harvest occurred during December and January. Historically, most harvest occurred during December through February. During the 2 years of the Fortymile Caribou Protection Plan, trappers who shifted their lines to western Unit 20E did so near the end of marten season (Feb) and were not totally operational until mid to late February resulting in a greater harvest during March.

Transport Methods. Most successful wolf trappers used snowmachines in Unit 20E (Table 4). Airplanes were used by a small number of trappers to access areas not trapped by land-based trappers. The number of wolves caught by trappers using airplanes for transportation was primarily dependent on market price for wolves, lynx, and marten. During years of high marten or lynx prices, these trappers reduced their wolf trapping efforts unless wolf pelt prices were also high. Most wolves taken by trappers using highway vehicles were taken along the southern half of the Taylor Highway between Chicken and the Alaska Highway.

HABITAT

Assessment

Prey availability dictates wolf habitat use, therefore, preferred wolf habitat occurs with a greater ungulate prey base. Because of the migratory behavior of caribou and their fidelity to calving grounds, there are temporal high densities of caribou available to certain wolf packs. Since winter 1997, the Nelchina and Mentasta caribou have primarily wintered in Unit 20E adding 25,000–40,000 caribou into the unit. Almost all Unit 20E wolf packs have thousands of caribou available to them throughout the winter. Between May and October, only the Fortymile Herd is in Unit 20E, and it is concentrated in certain areas. During this period, most packs must rely on moose or small mammals as their primary prey. Moose densities in Unit 20E are low ($0.2\text{--}0.9$ moose/mi², $\bar{x} = 0.46$ moose/mi²) (Gardner 2000). Those moose densities in conjunction with the temporal availability of caribou cannot support a large wolf population. Based on prey availability, wolf habitat currently is poor to moderate, but the habitat could support high populations of prey and wolves if environmental conditions or management actions allowed the ungulate populations to increase substantially.

Human development is not currently a problem for wolves in the area. Habitat quality for ungulates is currently not a limiting factor for any ungulate prey species.

Enhancement

Since the early 1970s, the Upper Tanana/Fortymile ecosystem has contained low density wolf and ungulate populations. To enhance the Fortymile caribou herd, nonlethal wolf control was implemented in November 1997. To enhance the moose population, 3 different prescribed burns during 1998 and 1999 were ignited and burned 95,000 acres. Also, Unit 20E is included in the Alaska Interagency Fire Management Plan. At least 60% of the area is classified in Limited Suppression status, which should assure a near-natural wildfire regime. This, in turn, should increase habitat diversity that will benefit wolf prey species.

NONREGULATORY MANAGEMENT PROBLEM/NEEDS

Effects of nutrition, weather, harvest, disease, and predation on Fortymile caribou herd growth have been studied since the mid-1970s (Davis et al. 1978; Boertje et al. 1987, 1988; Valkenburg and Davis 1989; Boertje and Gardner 1996). These studies documented that predation was the major factor limiting recovery of the herd primarily by causing high calf mortality during summer. Wolves and grizzly bears were identified as the primary predators. Between 1994 and 1998, wolves were responsible for 48–59% of herd mortality and grizzly bears were responsible for 22–24%.

In order for the Fortymile Herd to increase, reducing predation (especially on calves) was necessary. Results from 2 wolf control programs conducted in Yukon indicated that decreasing the number of wolves on the summer range would be sufficient to cause a decrease in the calf mortality rate.

During the mid-1990s population objectives for increasing the herd gained public support because most of the herd's traditional range was abandoned as herd size declined in the early

1970s and because the herd decline was in part a result of past management mistakes. In 1994, citizens from Dawson, Yukon and Tok, Alaska desiring management action to increase the herd approached the department to begin a Fortymile Caribou Management Plan. As a result, a diverse international planning team was developed in 1995 that included 13 public members and representatives from 5 state, federal, and territorial agencies. The Fortymile Caribou Management Team recommended multiple, simultaneous actions to reduce predation, including public trapping and nonlethal wolf control conducted by ADF&G.

Following are the proposed objectives, actions, and the desired outcomes:

Objective

- During 1997–2001, reduce wolves in 15 packs that inhabit the Fortymile caribou summer and calving ranges through harvest by the public and governmental, nonlethal predator control.

Actions

- Increase harvest of wolves by the public within the herd's summer and calving ranges.
- Reduce these 15 packs to the alpha pair by public trapping and government-conducted relocation of the remaining subordinate wolves. Subordinate wolves were moved at least 100 miles from their territory to areas that supported as high or higher ungulate populations.
- Sterilize the alpha male by vasectomy and the alpha female by tubal ligation to maintain pack size at 2 wolves.

Desired Result

- Reduce wolves to a level that will allow the caribou herd to grow at a moderate rate (5–10% annually).

If the ongoing wolf reduction techniques are successful, the wolf population within the summer range will be reduced by 70–80%. Wolf reductions of 69–85% resulted in dramatic increases in caribou numbers in Central Alaska (16% per year; Gasaway et al. 1983; Boertje and others 1996) and Eastcentral Yukon (18% per year; Farnell and Hayes, unpublished data). Under average environmental conditions, this level of wolf reduction on the Fortymile Herd's calving range is expected to result in herd growth of 5–10%. Under favorable conditions, growth rate could exceed 10%, based on herd population data from the 1980s and modeling (Boertje and Gardner 1996). Lower growth rates are expected in the Fortymile program compared to results in Central Alaska and Eastcentral Yukon because only a portion of the summer range is being controlled, while the entire herd range was controlled in the other 2 programs.

It is still too early in the program to ascertain effects of nonlethal control on caribou herd growth. However, we have collected preliminary data on wolf relocation and sterilization that

may be helpful for answering questions from managers. The majority of questions the department received prior to conducting wolf relocation had to do with 1) return rates of relocated wolves, 2) mortality rate of relocated wolves, and 3) the availability of suitable relocation sites.

Based on results from relocating wolves in Minnesota (Fritts et al. 1985), it appeared 100 miles away from the original territory was sufficient to keep them from returning. Also, average distances female and male wolves dispersed from their original territory was 71 and 53 miles, respectively, in Unit 13 (Ballard et al. 1997). We found that relocation distances of 100 miles was not sufficient for wolves >17 months old but was for wolves 11–13 months old. Over 50% of the > 17-month-old wolves returned within 3–8 months when moved 100–125 miles away from their original territory. None of the 11- to 13-month-old wolves returned after being moved 100–150 miles. Beginning in 1998, we moved all wolves older than 18 months >200 miles away from their territory and none has returned.

Various studies conducted in Alaska reported mortality rates for dispersing wolves of 40–70% (Peterson and others 1984; Ballard and others 1997). The mortality rate for wolves relocated from the Fortymile area was 56%. Trapping was the primary cause of mortality, similar to the other studies. It appears that moving subordinate wolves will not cause an increase in mortality if they are moved at the age when most wolves naturally disperse to areas that support prey densities as high or higher than the original territory.

Our preliminary data indicate that relocating wolves mimics natural dispersal in terms of wolf behavior and mortality and, in combination with trapping, highly effective in reducing wolf numbers. Socially however, relocating wolves is difficult. The initial reaction from most people when asked to accept wolves is, “No thank you we have plenty of wolves in our area already.” In only 2 cases did we find suitable places to move wolves without considerable effort. In all other cases, we had to conduct numerous public meetings before acceptance. Each year we faced the possibility of not finding enough sites to move 30 wolves. If a relocation program is to be successful in other areas of the state it will take a much greater commitment by the state. It will be imperative that the Board of Game and the director and regional supervisors take a much greater role working with the area biologists and other agencies in finding suitable areas.

Prior to the sterilization program, many members of the public questioned if the sterilization surgeries were safe, would the surgery be successful, and would the sterilized alpha pair be able to defend their territory against larger packs. We have sterilized 34 wolves (15 males; 19 females) without any complications. The wolves were released the day after surgery and all joined their packs within a day. We have monitored 13 sterilized packs through 1–2 denning periods, and none have had pups. As of February 2000, all 14 pairs have maintained their territories. Five of the sterilized wolves have died since November 1997; 4 have been killed by other wolves and 1 was trapped. In Denali National Park, 11% of the annual wolf mortality was due to other wolves (Mech and others 1998). The highest annual mortality rate due to wolves within the sterilized sample was 10%.

Wolf sterilization appears to be a viable technique to maintain wolf packs at 2 wolves. Sterilization is not a wolf reduction tool, but it is useful for maintaining the population at a desired level.

CONCLUSIONS AND RECOMMENDATIONS

The wolf population in Unit 20E is currently at a moderate density and is limited by low prey abundance. Prior to RY92, harvest by humans was below sustained harvest rates and did not affect overall wolf population growth. Market prices and private incentive programs prompted area trappers to select for wolves, and as a result, harvest increased and caused a wolf population decline in the central and western portions of the subunit during RY94–RY96. Following RY96, wolf harvest declined substantially and was not a limiting factor to population growth. Nonlethal wolf control in combination with public trapping has reduced wolf numbers within 14 pack territories located in portions of Units 20E, 20D, and 20B by 78%. The effects of this program on caribou, moose, and Dall sheep population growth will be analyzed and presented in future management and research reports.

Preliminary data indicates that wolf relocation mimics natural dispersal in terms of wolf behavior following release, and is an effective tool in reducing wolf numbers. Political and social opposition will limit its wide scale use. Wolf sterilization is safe and is effective in maintaining pack size at a desired level. The sterilized pairs in the Fortymile Nonlethal Wolf Control Area maintained their territories and experienced normal mortality rates.

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Table 1 Unit 20E fall wolf population estimates^a, regulatory years 1988–1989 through 1998–1999

Regulatory year	Population estimate ^b	Number of packs	Mean pack size ^c	Basis of estimate
1988–1989	173	32	4.9	Aerial survey, observations, reports
1989–1990	205	33	5.6	Aerial survey, observations, reports
1990–1991	231	33	6.3	Aerial survey, observations, reports
1991–1992	169–184	31	5.1	Aerial survey, observations, reports, radiocollars
1992–1993	194–214	32	5.7	Aerial survey, observations, reports, radiocollars
1993–1994	200–224	34	5.7	Aerial survey, observations, reports, radiocollars
1994–1995	192–204	34	5.3	Aerial survey, observations, reports, radiocollars
1995–1996	227–238	34	6.2	Aerial survey, observations, reports, radiocollars
1996–1997	220–230	34	6.0	Aerial survey, observations, reports, radiocollars
1997–1998	221–236	34	6.0	Aerial survey, observations, reports, radiocollars
1998–1999	195–225	34	5.6 (6.2) ^d	Aerial survey, observations, reports, radiocollars

^a Fall estimate = pretrapping season population.

^b Includes 10% estimated number of single wolves present.

^c Calculated using mean population estimate $\times 0.9$ divided by number of packs.

^d In parentheses is mean pack size for all packs not affected by the nonlethal wolf control program.

Table 2 Unit 20E wolf harvest, regulatory years 1988–1989 through 1998–1999

Regulatory Year	Reported harvest					Method of take							Successful		
	M	(%)	F	(%)	Total ^a	% Autumn population ^b	Trap or snare	(%)	Shot	(%)	SDA ^c	(%)	Unk	Trappers and hunters	Wolves/ person
1988–1989	2	(22)	7	(78)	9	5	7	(78)	2	(22)			6	6	1.5
1989–1990	7	(54)	6	(46)	15	7	12	(80)	3	(20)			10	10	1.5
1990–1991	15	(63)	9	(37)	24	10	12	(52)	5	(22)	6	(26)	1	13	1.8
1991–1992	13	(68)	6	(32)	19	11	14	(77)	1	(5)	3	(17)	1	10	1.9
1992–1993	28	(49)	28	(49)	57	28	52	(95)	3	(5)	0	(00)	2	21	2.7
1993–1994	34	(57)	26	(43)	68	32	55	(90)	6	(10)	0	(00)	7	21	3.2
1994–1995	24	(63)	14	(37)	39	20	29	(74)	8	(21)	2	(05)	0	16	2.4
1995–1996	37	(51)	39	(49)	84	37	80	(95)	3	(4)	1	(01)	0	18	4.6
1996–1997	24	(44)	23	(43)	54	24	48	(89)	6	(11)			0	15	3.6
1997–1998	16	(44)	20	(56)	36 ^d	16	32	(89)	3	(8)			0	10	3.5
1998–1999	9	(53)	6	(35)	17	8	12	(71)	5	(29)			0	9	1.9

^a Total harvest includes animals of undetermined sex.

^b Proportion of the estimated fall population harvested by the end of the season in April. If a range was given for the fall estimate, the proportion taken is given as the harvest divided by the mean estimate.

^c SDA taking prohibited during RY88 and RY89 and beginning in RY97.

^d One wolf was accidentally killed during a capture operation; it was only included in the total take.

Table 3 Unit 20E wolf harvest chronology, regulatory years 1988–1989 through 1998–1999

Regulatory year	Harvest periods																n ^a		
	Aug	(%)	Sep	(%)	Oct	(%)	Nov	(%)	Dec	(%)	Jan	(%)	Feb	(%)	Mar	(%)		Apr	(%)
1988–1989	0	(0)	1	(11)	0	(0)	0	(0)	2	(22)	2	(22)	3	(33)	1	(11)	0	(0)	9
1989–1990	0	(0)	2	(13)	1	(7)	2	(13)	3	(20)	6	(40)	1	(7)	0	(0)	0	(0)	15
1990–1991	3	(15)	2	(10)	0	(0)	0	(0)	2	(10)	4	(20)	3	(15)	2	(10)	4	(20)	24
1991–1992	0	(0)	1	(6)	1	(6)	2	(11)	4	(22)	4	(22)	5	(28)	1	(6)	0	(0)	19
1992–1993	0	(0)	3	(5)	1	(2)	1	(2)	6	(11)	13	(23)	18	(32)	10	(18)	5	(9)	57
1993–1994	2	(3)	3	(5)	4	(6)	8	(13)	18	(29)	8	(13)	12	(19)	6	(10)	1	(2)	68
1994–1995	3	(8)	2	(5)	3	(8)	3	(8)	7	(18)	5	(13)	9	(23)	7	(18)	0	(0)	39
1995–1996	1	(1)	1	(1)	4	(5)	12	(14)	11	(13)	10	(12)	24	(29)	15	(18)	5	(6)	84
1996–1997	0	(0)	4	(7)	0	(0)	1	(2)	15	(28)	14	(26)	4	(7)	13	(24)	3	(6)	54
1997–1998	0	(0)	2	(6)	0	(0)	3	(8)	8	(22)	14	(39)	3	(8)	5	(14)	0	(0)	36
1998–1999	0	(0)	4	(24)	0	(0)	0	(0)	2	(12)	4	(24)	3	(18)	4	(24)	0	(0)	17

^a Total includes wolves for which date of take was unknown.Table 4 Unit 20E wolf harvest by transport method, regulatory years 1988–1989 through 1998–1999^a

Regulatory year	Harvest by transport method															n
	Airplane	(%)	Dogsled, skis, or snowshoes	(%)	Boat	(%)	3- or 4-Wheeler	(%)	Snowmachine	(%)	ORV	(%)	Highway vehicle	(%)	Unk	
1988-1989	1	(11)	1	(11)	0	(0)	1	(11)	6	(67)	0	(0)	0	(0)	0	9
1989-1990	1	(7)	5	(33)	0	(0)	0	(0)	7	(47)	1	(7)	1	(7)	0	15
1990-1991	8	(33)	1	(4)	0	(0)	2	(9)	10	(43)	0	(0)	2	(9)	1	24
1991-1992	4	(24)	1	(6)	0	(0)	1	(6)	10	(59)	0	(0)	1	(6)	2	19
1992-1993	6	(11)	6	(11)	0	(0)	0	(0)	41	(72)	0	(0)	4	(7)	0	57
1993-1994	16	(24)	0	(0)	0	(0)	1	(1)	31	(46)	0	(0)	19	(28)	1	68
1994-1995	14	(36)	0	(0)	0	(0)	0	(0)	23	(59)	0	(0)	2	(5)	0	39
1995-1996	11	(13)	3	(4)	0	(0)	1	(1)	67	(80)	0	(0)	2	(2)	0	84
1996-1997	5	(9)	0	(0)	1	(2)	1	(2)	43	(83)	1	(2)	1	(2)	2	54
1997-1998	1	(3)	0	(0)	0	(0)	1	(3)	22	(61)	0	(0)	11	(31)	0	36
1998-1999	2	(12)	0	(0)	0	(0)	1	(6)	6	(35)	0	(0)	8	(47)	0	17

^a Unknown transport not used to calculate harvest percent.

LOCATION

GAME MANAGEMENT UNITS: 21B, 21C, 21D (20,655 mi²)

GEOGRAPHIC DESCRIPTION: Yukon River drainage above Paimiut to Tozitna River, including Koyukuk River up to Dulbi Slough

BACKGROUND

Wolves were present when humans first settled the area and are an important part of the local culture. They are throughout Unit 21 in all habitat types, even near human settlements. Populations have fluctuated depending upon the availability of prey species and wolf harvest by humans.

Unit 21D and the lowlands of Unit 21B have more wolves than Unit 21C. In Unit 21D wolf numbers were probably lower before the early 1940s because moose were scarce and caribou availability fluctuated. Immigration of moose coincident with federal wolf control rapidly increased the moose population. In the mid-1950s, moose densities were estimated to be similar to current estimates (3–9 moose/mi²) in the Koyukuk lowlands near Three-day Slough. When federal wolf control ceased, wolf numbers increased. Local residents believe wolf numbers are presently higher than historic levels. In Units 21B and 21C, wolf populations may be lower than in the early 1900s due to lower densities of moose in those areas.

Each year many wolf pelts taken for personal use are not sealed; therefore, actual harvest is higher than reported on sealing certificates or on export and acquisition documents. Personal use includes making wolf parka ruffs that are presented by local families as gifts to others at traditional potlatches. Additionally, many local residents make a conscious effort to increase their wolf harvest for personal uses when moose are scarce because they feel wolves are competitors for moose meat.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

Wolf populations will be managed to provide for human uses and to ensure that wolves remain an integral part of Interior Alaska's ecosystems. Management may include manipulation of wolf population size and total protection of wolves from human influence. Not all human uses will be allowed in all areas or at all times; management will focus on providing sustained, diverse human uses of wolf populations consistent with goals listed in the Wolf Conservation and Management Policy for Alaska, adopted by the Alaska Board of Game 30 October 1991 and revised 29 June 1993.

- Ensure long-term conservation of wolves throughout their historic range in Alaska in relation to their prey and habitat.

- Provide for broadest possible range of human uses and values of wolves and their prey populations that meet wildlife conservation principles and which reflect the public's interest.
- Increase public awareness and understanding of uses, conservation and management of wolves, their prey, and habitat in Alaska.

MANAGEMENT OBJECTIVE

- Provide for a sustained annual harvest rate of no more than 30% from the combined wolf population of Units 21B, 21C and 21D.

Related Management Activities

- Monitor harvest through sealing records and trapper questionnaires.
- Monitor wolf numbers and population characteristics through interviews with trappers, hunters, pilots, and by evaluation of sealing documents.
- Participate in trapper education to enhance trapper skills and ethics and to increase regulatory compliance.
- Cooperate with any ongoing wolf studies conducted by the US Fish and Wildlife Service (FWS).
- Model the potential effects of wolf predation on ungulates in each unit.

METHODS

We worked cooperatively with FWS to estimate the late winter wolf population and pack size using aerial surveys. In February 1994, a Sample Unit Probability Estimator (SUPE) survey (Becker et al. 1998) was conducted in Unit 21D. The unit was divided into 760 sample units of 16 mi² each, and each unit was classified into 1 of 3 density strata; high, medium, or low. The probability of sighting wolf tracks after a fresh snowfall was used to estimate the population. Once tracks were sighted they were followed until wolves were sighted and counted. SUPE surveys were also conducted during March 1996 in Unit 21B and during March 2000 primarily in Unit 24, but along the common boundary of Unit 21D.

A wolf reconnaissance survey was flown in the northern portion of Unit 21D in March 1999 using SUPE methodology. However, we were unable to satisfy assumptions required for application of the technique because of poor snow conditions. Therefore, a minimum estimate for the area was developed from the data (ADF&G files, Galena, 7 May 1999).

Fall wolf population and pack size was estimated for Unit 21D by adding overwinter mortality (26%, Spindler 1992) and hunting mortality to the late winter population estimates. Late winter estimates and fall population estimates were the same in Units 21B and 21C because no overwinter mortality data was available and harvest was relatively small in those subunits. Population data were summarized by regulatory year (RY = 1 Jul through 30 Jun, e.g., RY99 = 1 Jul 1999 through 30 Jun 2000).

We cooperated with FWS to determine wolf pack distribution and movements during 1989–1995. Katnik (1997) described radiotelemetry methods employed in that study.

Wolves harvested by trappers and hunters were sealed to monitor harvest. Information recorded for each wolf included date of kill, name of trapper or hunter, location of kill, method of take and transportation, sex of the wolf, color of the pelt, and the number of other wolves thought to be in the pack. Trapper interviews were also used to monitor harvest. Data were summarized by regulatory year.

We conducted wolf snaring and trapper education courses during RY99 in local villages to improve trapper skills and knowledge of wildlife management issues.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Wolf population estimates increased during RY91–RY95 (Table 1), but some of the increase resulted from better survey information and extrapolation of density estimates from surveyed areas to unsurveyed areas.

We completed a SUPE survey in Unit 21D (12,113 mi²) during 8–16 March 1994. Of 760 sample units, 66.6% of the highs, 33% of the medium, and 14% of the low stratum were flown and searched for wolf tracks. We observed 173 wolves (or distinct tracks). The estimated unit population was 220–292 (\bar{x} = 256; 80% CI \pm 14.2%) with a density of 18.1–24.3 wolves/1000 mi² (7.0–9.4 wolves/1000 km²) (\bar{x} = 21.2 wolves/1000 mi² or \bar{x} = 8.2 wolves/1000 km²). The number of single wolves was 6.5% of the total. We also estimated 49.3 ± 6.1 packs.

We completed an aerial reconnaissance survey during March 1999 in the northern portion of Unit 21D. Eighty-seven wolves were seen, along with distinct tracks of 39 additional wolves, indicating 126 wolves in 20 packs with a density of 32.1 wolves/1000 mi² (12.4 wolves/1000 km²). We also completed a SUPE survey in adjacent Unit 24 during March 2000 that included part of the area surveyed during 1999 in Unit 21D. In the Unit 24 survey, the population estimate was 147.8 wolves (\pm 32.2; 90% CI) over a 4175-mi² survey area for a density of 35.5 wolves/1000 mi² (13.7 wolves/1000 km²). Using data from both Unit 21D and Unit 24, I estimated the late winter 2000 wolf population in all of Unit 21D was 309–445 wolves (\bar{x} = 377) in 37–55 packs (9.8–14.2 wolves/1000 km²).

We completed a SUPE survey in Unit 21B (4871 mi²) during 15–17 March 1996 to estimate wolf population. Of the 307 sample units, 59% of the highs, 30% of the medium, and 15% of the low stratum were flown and searched for tracks. The estimate was 56–80 wolves (\bar{x} = 68; 80% CI \pm 17.8%), with a density of 11.4–17.4 wolves/1000 mi² (4.4–6.7 wolves/1000 km²; \bar{x} = 5.4). Although no surveys were completed in Unit 21B during this reporting period, trapper reports, incidental field observations (M Spindler, FWS, personal communication) and local resident comments suggested the population increased. Using the annual rate of growth

observed in Unit 21D of 3.4%, I estimated the Unit 21B population was 56–96 wolves (\bar{x} = 76 wolves) in 9–15 packs. Using the estimate upper confidence limit, this estimate indicates an increase of 13.6% between late winter 1996 and late winter 2000.

Unit 21C was not surveyed. During the previous reporting period, the fall density was 12.9–18.1 wolves/1000 mi² (5–7 wolves/1000 km²) (Woolington 1997). Based on this information, I estimated the Unit 21C late winter population was 48–66 wolves in 6–10 packs.

The total population during fall in all 3 subunits likely increased during RY96–RY98. Using all data sources, estimates were 345–524, 379–623, and 413–722 during RY96, RY97 and RY98, respectively. The number of packs during those regulatory years were estimated to be 52–68, 52–74, and 52–80, respectively.

Distribution and Movements

Beginning in 1986, 50 wolves were radiocollared in 25 packs on the Koyukuk National Wildlife Refuge (NWR) and the Nowitna NWR. Wolves were collared at Dalki River, Upper Dulbi River, Lower Dulbi River, Nayuka River, Nowitna River mouth, Monzonite Hills, Ham Island, Three-day Slough, Bishop Rock, Happy Slough, Bonanza Creek, North Creek and Bear Creek. On the Kaiyuh Flats the density was 28.5 wolves/1000 mi² (11 wolves/1000 km²); on the Koyukuk lowlands north of Galena (including Three-day Slough) the density was 20.7 wolves/1000 mi² (8 wolves/1000 km²); and in the Nowitna drainage the density was 18.1 wolves/1000 mi² (7 wolves/1000 km²) (Spindler 1992).

Telemetry data showed that most packs occupied territories of 250–500 mi² (Katnik 1997). Some packs vacated their initial home ranges and moved to adjacent areas, but they were not followed long enough to see if they returned to their initial ranges. Several wolves that were pack members or were alone when collared, moved large distances during the study. One wolf moved south 40 miles and then returned north.

Wolf distribution in the Katnik (1997) study, was evaluated with respect to moose distribution and riparian habitat. Not surprisingly, he found that wolf packs spent disproportionately greater amounts of time in both riparian and nonriparian area that had high moose densities. Additionally, they spent disproportionately less time in nonriparian areas with medium or low moose densities. However, wolf packs did not necessarily spend more time in the high-density moose areas of their established territories (Katnik and Spindler 1998), possibly due to the behavioral activity of maintaining territory boundaries. Rivers and small drainages apparently provided important travel routes throughout wolf territories, but low sample sizes precluded definitive evaluation of wolf distribution relative to habitat.

MORTALITY

Harvest

Seasons and Bag Limits.

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
Units 21B, 21C, and 21D		
Hunting: 5 wolves.	10 Aug–30 Apr	10 Aug–30 Apr
Trapping: No limit.	1 Nov–30 Apr	1 Nov–30 Apr

Board of Game Actions and Emergency Orders. In RY94 the board continued the ban on same-day airborne hunting but allowed taking wolves the same-day airborne under trapping regulations if the trapper moved 300 ft from the aircraft before taking a free-ranging wolf. Beginning RY97 this provision of same-day airborne harvest was eliminated in the trapping regulations as well. Beginning RY95 the trapping season was extended through April.

Hunter/Trapper Harvest. Hunters and trappers reported harvesting 34, 31, and 60 wolves during RY96, RY97, and RY98, respectively (Table 2). Most of the wolves were taken in Unit 21D. The actual number harvested was probably higher because most village residents seal only those wolf pelts that are sent to a commercial tannery or sold to a fur buyer. This unreported harvest likely averaged 20 wolves/year.

In December 1999, ADF&G sponsored 2 wolf-snaring clinics. Twenty-one trappers from Galena and 18 trappers from Huslia attended the 2-day clinics. Snaring techniques, snare building instruction, leghold trapping techniques and fur handling were presented. Supplies were available for snare construction, and participants built and took home >300 wolf snares. Participants were sent follow-up mailings regarding sources of trapping and snaring supplies. They were also registered for the statewide trapper questionnaire.

Harvest Chronology. Most wolves were harvested in January, February and March during RY94–RY98 (Table 3). Increased sightings and incidental harvest during the fall moose hunting seasons was probably due to higher wolf densities.

Transport Methods. Most wolves were taken using snowmachines for transportation during RY94–RY98 (Table 4).

CONCLUSIONS AND RECOMMENDATIONS

The total wolf population in the reporting area increased during RY96–RY98 because moose populations increased through 1996 in most of the area. However, individual subunits varied. Densities probably increased in Units 21B and 21D and were unchanged in Unit 21C.

Total harvest in all 3 subunits during RY98 was a maximum of 80 wolves, which was probably 11–19% of the population. Therefore, the first management objective to provide for a sustained annual harvest rate of no more than 30% of the wolf population was met. However, if the wolf population continues to grow unchecked, moose numbers are expected to decline. Moose are an important resource for local subsistence hunters. Additionally,

because moose are the primary prey species in this area, a reduction in their numbers will subsequently cause a decline in wolves.

All of the other management objectives were also met during the reporting period. Harvest monitoring was an important part of the wolf management program. It included the statewide sealing system, trapper questionnaires, and trapper interviews. Trapper education courses were effectively utilized. All of the wolf radiotelemetry work was concluded during the reporting period, and we cooperated extensively with the FWS in those efforts. Finally, although a definitive model of wolf predation dynamics was not fully completed, we applied the PredPrey computer model (McNay and DeLong 1998) in several scenarios. Work with the PredPrey model will be continued.

I recommend continued trapper education programs to improve harvest reporting and to increase trapper skills, ethics, and knowledge. I also recommend more radiotelemetry studies and continued spring population estimation surveys to improve our understanding of wolf populations. Within the Koyukuk/Nowitna NWR in Units 21B and 21D, radiotelemetry studies have improved wolf population estimates and increased our information about wolf predation on moose.

Management direction for the next reporting period will be as listed below:

MANAGEMENT GOALS

- Ensure long-term conservation of wolves throughout their historic range in Alaska in relation to their prey and habitat.
- Provide for broadest possible range of human uses and values of wolves and their prey populations that meet wildlife conservation principles and which reflect the public's interest.
- Increase public awareness and understanding of uses, conservation and management of wolves, their prey, and habitat in Alaska.

MANAGEMENT OBJECTIVES

- Maintain a fall density of 18–23 wolves/1000 mi² (7–9 wolves/1000 km²).
- Provide for a total annual harvest of 85–105 wolves.
- Increase trapper participation in statewide trapper survey by at least 1% annually.

MANAGEMENT ACTIVITIES

- Conduct surveys to estimate population size and density.
- Model the potential effects of wolf predation on ungulates in each unit.
- Monitor harvest through sealing records and trapper questionnaires.

- Monitor wolf numbers and population characteristics through interviews with trappers, hunters, pilots, and by evaluation of sealing documents.
- Conduct trapper education clinics.

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Table 1 Unit 21B, 21C, and 21D fall wolf population estimates^{ab}, regulatory years 1988–1989 through 1998–1999

Regulatory year	Population estimate	Number of packs
1988–1989	305–330	42–52
1989–1990	295–340	40–55
1990–1991	295–335	54–58
1991–1992	285–340	50–53
1992–1993	295–365	50–53
1993–1994	395–505	49–57
1994–1995	339–432	49–57
1995–1996	311–425	52–62
1996–1997	345–524	52–68
1997–1998	379–623	52–74
1998–1999	413–722	52–80

^a Fall estimate = pretrapping season population.

^b Based on Alaska Department of Fish and Game/US Fish and Wildlife Service sample unit probability estimator surveys, wolf reconnaissance aerial surveys, hunter/trapper reports, sealing records, incidental observations and assumed density of 12.9–18.1 wolves/1000 mi² (5–7 wolves/1000 km² in unsurveyed areas).

Table 2 Units 21B, 21C, 21D wolf harvest, regulatory years 1988–1989 through 1998–1999

Regulatory year	Reported harvest				Estimated unreported harvest	Total estimated harvest	Method of take			
	M	F	Unk	Total			Trap/snare	Shot	SDA ^a	Unk
1988–1989	5	6	0	11	20	31	3	2	5	1
1989–1990	14	15	0	29	20	49	7	3	19	0
1990–1991	14	4	3	21	20	41	9	12	0	0
1991–1992	22	14	4	40	20	60	19	18	1	2
1992–1993	20	11	4	35	20	55	15	16	0	4
1993–1994	31	23	1	55	20	75	38	16	0	1
1994–1995	17	11	7	35	20	55	11	18	6	0
1995–1996	16	28	3	47	20	67	29	18	0	0
1996–1997	15	18	1	34	20	54	26	8	0	0
1997–1998	12	19	0	31	20	51	19	12	0	0
1998–1999	38	21	1	60	20	80	35	25	0	0

^a Wolves taken by hunters the same day they were airborne. In regulatory years 1994–1995 through 1996–1997 this includes wolves taken by trappers using aircraft for transportation.

Table 3 Units 21B, 21C, and 21D wolf harvest chronology percent by time period, regulatory years 1991–1992 through 1998–1999

Regulatory year	Harvest periods							n ^a
	Aug–Oct	Nov	Dec	Jan	Feb	Mar	Apr	
1991–1992	2	2	9	18	45	23	0	44
1992–1993	2	0	0	14	24	57	2	49
1993–1994	2	0	29	23	29	17	0	52
1994–1995	8	14	6	8	17	44	3	36
1995–1996	6	3	9	17	11	43	11	35
1996–1997	9	18	9	15	24	26	0	4
1997–1998	21	3	7	17	28	24	0	29
1998–1999	14	9	12	14	29	21	5	58

^a Includes harvest from records received after total harvest was calculated.

Table 4 Units 21B, 21C, 21D wolf harvest percent by transport method, regulatory years 1991–1992 through 1998–1999

Regulatory year	Harvest percent by transport method								<i>n</i> ^a
	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unk	
1991–1992	41	32	11	2	2	0	0	11	44
1992–1993	6	0	0	0	86	0	0	8	49
1993–1994	0	2	2	0	88	0	0	8	52
1994–1995	19	3	5	0	49	0	0	24	37
1995–1996	0	3	6	0	91	0	0	0	35
1996–1997	0	3	6	0	88	0	3	3	34
1997–1998	0	19	16	0	61	0	0	3	31
1998–1999	2	2	10	0	85	0	0	2	60

^a Includes harvest from records received after total harvest was calculated.

LOCATION

GAME MANAGEMENT UNIT: 22 (25,230 mi²)

GEOGRAPHIC DESCRIPTION: Seward Peninsula and the adjacent mainland drained by all streams flowing into Norton Sound.

BACKGROUND

Wolves were scarce throughout Unit 22 for much of this century. From the late 1890s, when reindeer herding was introduced to the Seward Peninsula, until statehood in 1959, wolf numbers were actively suppressed by predator control programs and bounties intended to protect reindeer. In the 1960s, after government sponsored predator control ended, wolf numbers in Unit 22 gradually increased and wolves expanded their range westward across the Seward Peninsula (Pegau 1971 and Grauvogel 1979). By 1980, wolf sign was reported in all major drainages in Unit 22, but reported sightings were generally of individual animals or small groups of 2 to 3 wolves. At the time the Unit 22 wolf population was estimated at fewer than 100 wolves (Grauvogel 1980). Throughout the 1980s and 1990s, reported observations and data from sealing certificates indicate wolf numbers and pack sizes have gradually increased. Wolves are most abundant in Units 22A and 22B where caribou from the Western Arctic caribou herd (WACH) have wintered since the 1980s.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Maintain viable wolf populations in Unit 22.
- Minimize adverse interactions between wolves and the public.

MANAGEMENT OBJECTIVES

- Maintain license vendors and fur sealers in all Unit 22 villages.
- Monitor wolf harvest through the fur sealing program, annual hunter/trapper questionnaires and big game harvest surveys conducted annually in selected Unit 22 villages.
- Improve compliance with current sealing requirements through public communication and education.
- Assess population status and trends utilizing sealing records, hunter/trapper interviews and questionnaires, village harvest surveys and observations by staff and the public.
- Cooperate with reindeer herders to evaluate methods for reducing adverse interactions between wolves and reindeer.

METHODS

No surveys or studies have been conducted in Unit 22 to assess wolf numbers, distribution or movements. Limited information concerning wolf distribution, population trends, harvest, and human use are obtained annually from sealing certificates and observations by staff, reindeer herders, and other local residents. During the 1998–1999 regulatory year, two other methods of collecting information about wolf harvest and abundance were initiated in Unit 22; big game harvest surveys were conducted in two Unit 22 villages and fur-harvest questionnaires were sent to hunter/trappers throughout the unit.

POPULATION STATUS AND TREND

Population Size

The size of the Unit 22 wolf population is unknown. Wolf densities are highest in Units 22A and eastern 22B. Since the 1980s, Survey and Inventory reports have noted a gradual increase in wolves in those units, particularly during winter months, associated with wintering WACH caribou in the Nulato Hills and on the base of the Seward Peninsula (Machida 1997). Since 1996, caribou have extended their winter range onto the central Seward Peninsula and observations and harvests of wolves from the central and western parts of Unit 22 indicate wolf numbers have increased concurrently. We believe that wolf numbers increase seasonally during the winter months when WACH caribou are present, but increasingly, wolves have become permanent residents of the unit.

In 1998–1999, Unit 22 participated for the first time in the statewide trapper survey program. To better assess harvest and abundance of wolves and other furbearers, questionnaires were sent to hunter/trappers who sealed furs harvested in the unit. Respondents from Units 22A and 22B reported that wolves were common and numbers seem to be increasing. Respondents from the remainder of the unit reported that wolves were scarce but most thought numbers were increasing.

Predation by wolves has not previously been considered a significant factor in ungulate mortality, but that may change if pack numbers and sizes continue to increase.

Population Composition

We have no survey data or information to determine the composition of the wolf population in Unit 22.

Distribution and Movements

Seasonal ranges occupied by caribou and reindeer likely influence the distribution of wolves in Unit 22. Higher wolf numbers are distributed in Units 22A and 22B than in the western portions of Unit 22. In past years, radiocollared wolves from other locations in Alaska have been observed or harvested in Unit 22 indicating that immigration of wolves from other areas occurs in Unit 22.

MORTALITY

Harvest

Season and Bag Limits. The season and bag limits were the same for all regulatory years in the reporting period.

1996–1997 to 1998–1999	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Units and Bag Limits		
Unit 22		
Residents and Nonresidents:		
Trapping - no limit	1 Nov–30 Apr	1 Nov–30 Apr
Hunting - 5 wolves	10 Aug–30 Apr	10 Aug–30 Apr

Board of Game Actions and Emergency Orders. There were no Board actions or emergency orders affecting wolf hunting or trapping in Unit 22 during the reporting period.

Hunter/Trapper Harvest. The reported harvest during the reporting period ranged from 25 to 51 wolves (Table 1). The high harvest in 1998–1999 probably resulted largely from excellent snow conditions in spring 1999 that allowed hunters and trappers long periods of snowmachine access for wolf hunting and trapping. In contrast, in spring 1997, an early breakup ended snowmachine travel by late March and half as many wolves were harvested in 1996–1997. Sex composition of the reported harvest during the 3-year reporting period was as follows: 65% males, 26% females, and 9% sex unknown ($n = 105$). As in previous years, the majority of wolves were harvested in Units 22A and 22B. Throughout much of the 1990s, small wolf harvests have come from Units 22C and 22D, but not until 1998–1999 were wolves reported taken in Unit 22E (Table 2). In 1998–1999, 67% more hunter/trappers reported harvesting wolves in Unit 22 than ever before: 30 individuals sealed wolves compared to the previous high of 18.

The magnitude of unreported wolf harvest each year in Unit 22 is thought to be substantial and fur sealing data provides only a minimum estimate of harvest. Although fursealing agents are available in all Unit 22 villages, often hunter/trappers seal only those pelts that will be commercially tanned or sold to furbuyers. Many wolf hides are home tanned and used locally and people see no reason to seal them. In April 1999, village-based harvest surveys were conducted for the first time in two Unit 22 villages to obtain better harvest information on big game species, including wolves. Surveys in Koyuk and Shaktoolik showed that in 1998–1999, 23 wolves were harvested by Koyuk residents and 19 wolves were taken by Shaktoolik residents. Twenty two percent of the wolf harvest in Koyuk and 58% of the Shaktoolik harvest was sealed (Table 3). The total known wolf harvest from Unit 22 during 1998–1999, including wolves that were sealed and those taken by Koyuk and Shaktoolik residents and not sealed, was 77 wolves.

Permit Hunts. There were no permit hunts for wolves in Unit 22 during the reporting period.

Hunter Residency and Success. Sealing certificate data indicate that residents of Unit 22 harvested 94% of the wolves taken during the reporting period. Residents from Unit 22A and 22B harvested most of the wolves. Two wolves were taken by residents of adjoining Unit 18, 2 were taken by other Alaska residents and 2 were taken by nonresidents.

Harvest Chronology. Wolf harvest in Unit 22 occurs primarily in the winter months when snow machines can be used for transportation, hides are prime and wolves are most abundant due to the presence of caribou. During this reporting period, 91% of the harvest occurred between November and April, 8% in September and 1% in October.

Harvest Methods. Most of the wolf harvest in Unit 22 is by subsistence and recreational hunters or is done opportunistically by local residents while engaged in other activities. There are few serious trappers in Unit 22. During the reporting period, 75% ($n = 105$) the wolves were shot, 15% were trapped or snared and the method of harvest was unknown for the remaining 10% (Table 1).

Transport Methods. During the reporting period, 91% of hunter/trappers reported using snowmachines for transportation. During snow-free months, nine wolves were taken by individuals using airplanes, highway vehicles, boats and four-wheelers for transportation.

Other Mortality

There were no observations of other mortality factors affecting wolves in Unit 22 during the reporting period.

HABITAT

Assessment and Enhancement

There were no habitat assessment activities or habitat enhancement projects for wolves in Unit 22 during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

There were no nonregulatory management issues to report related to wolves in Unit 22 during the reporting period.

CONCLUSIONS AND RECOMMENDATIONS

Although quantitative data are not available, wolf densities are increasing throughout Unit 22 and are highest in Units 22A and 22B. The expansion of the WACH caribou winter range on the Seward Peninsula is thought to be responsible for the increase. If this trend continues, wolf predation may increasingly become a factor affecting moose management.

Participation in the statewide Trapper Questionnaire program was beneficial by providing impressions about abundance of wolves and other furbearers from numerous hunters/trappers throughout the unit.

Big game harvest surveys proved to be an effective method of gathering more accurate harvest information from selected villages compared to what we have obtained in the past. This program should be continued annually by surveying additional villages and repeating those previously surveyed to look at annual variations in harvest. A more active information and education program, emphasizing the importance of harvest information to wildlife management, may improve compliance with sealing requirements.

Quantitative data on wolf populations of Unit 22 are lacking. It would be beneficial to initiate wolf surveys in the unit to improve our understanding of wolf population dynamics and the effects of wolf predation on local ungulate populations of Unit 22.

No changes in Unit 22 hunting or trapping regulations for wolves are recommended at this time.

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Table 1 Reported Unit 22 wolf harvest for regulatory years 1985–1986 through 1998–1999

Regulatory year	Reported harvest				Method of take			Total successful
	M	F	Unk.	Total	Trap / Snare	Shot	Unk.	Trapper / hunters
1985–1986	0	1	2	3	0	3	0	1
1986–1987	4	2	2	8	1	7	0	5
1987–1988	8	6	10	24	14	10	0	8
1988–1989	11	8	2	21	1	20	0	9
1989–1990	28	13	2	43	0	43	0	14
1990–1991	14	11	6	31	5	26	0	11
1991–1992	21	13	20	54	3	51	0	18
1992–1993	14	7	6	27	4	17	6	11
1993–1994	24	8	2	34	2	24	8	16
1994–1995	15	2	7	24	1	23	0	16
1995–1996	19	8	5	32	0	29	3	16
1996–1997	19	4	2	25	3	21	1	18
1997–1998	16	11	2	29	7	16	6	14
1998–1999	33	12	6	51	6	42	3	30

Table 2 Reported wolf harvest by unit, 1990–1991 through 1998–1999

Regulatory year	Harvest 22A	Harvest 22B	Harvest 22C	Harvest 22D	Harvest 22E
1990–1991	21	8	0	2	0
1991–1992	43	9	0	2	0
1992–1993	13	11	2	1	0
1993–1994	23	11	0	0	0
1994–1995	13	9	2	0	0
1995–1996	15	16	1	0	0
1996–1997	15	10	0	0	0
1997–1998	19	9	1	0	0
1998–1999	25	18	2	2	4

Table 3 Wolf harvest by residents of Koyuk and Shaktoolik, 1998–1999

Village	Wolf harvest reported on village surveys	Number of households reporting wolf harvest on village surveys	Number of wolves sealed	Number of hunters who sealed wolves	Percent of village wolf harvest reported by sealing certificate
Koyuk	23	10	5	3	22%
Shaktoolik	19	14	11	6	58%

Alaska's Game Management Units

